General

Guideline Title

ACR Appropriateness Criteria® palpable abdominal mass.

Bibliographic Source(s)

Yaghmai V, Yee J, Cash BD, Feig BW, Fowler KJ, Gage KL, Hara AK, Kim DH, Lambert DL, Levy AD, Scheirey CD, Smith MP, Lalani T, Carucci LR, Expert Panel on Gastrointestinal Imaging. ACR Appropriateness CriteriaÂ® palpable abdominal mass [online publication]. Reston (VA): American College of Radiology (ACR); 2014. 5 p. [17 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Jung AJ, Yee J, Rosen MP, Blake MA, Baker ME, Cash BD, Fidler JL, Greene FL, Hindman NM, Jones B, Katz DS, Lalani T, Miller FH, Small WC, Sudakoff GS, Tulchinsky M, Yaghmai V, Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® palpable abdominal mass. [online publication]. Reston (VA): American College of Radiology (ACR); 2011. 4 p. [10 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

ACR Appropriateness Criteria®

Clinical Condition: Palpable Abdominal Mass

Radiologic Procedure	Rating	Comments	RRL*
CT abdomen with contrast	9	Use of intravenous contrast may help better delineate the mass.	
MRI abdomen without and with contrast	9	Use of intravenous contrast may help better delineate the mass.	O
CT abdomen without contrast	4	Use of intravenous contrast may help better delineate	*Relative Radiation

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

Radiologic Procedure	Rating	Comments	RRL*
MRI abdomen without contrast	8		O
US abdomen	7	This procedure may be appropriate as a first imaging examination for certain abdominal masses in adults (e.g., superficial). Usually this is the first examination in pediatric and pregnant patients.	O
CT abdomen without and with contrast	6	This procedure without, followed by with, contrast may be useful in cases in which enhancement pattern of mass may help differentiate or further characterize the lesion.	
X-ray abdomen	5	This procedure is a simple and inexpensive way to evaluate bowel for obstruction or constipation as the cause of the mass.	
X-ray contrast enema	4		
X-ray upper GI series	4		
X-ray upper GI series with small bowel follow-through	4		
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Note: Abbreviations used in the table are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Introduction/Background

Pathology associated with palpable masses is extensive, hence subcategorization is often helpful. Palpable abdominal masses can often be characterized by physical examination as abdominal wall masses such as lipomas, hematomas, lymph nodes, endometriomas, and hernias or intra-abdominal masses including neoplasms and abdominal aortic aneurysms. Evaluation of pulsatile abdominal mass is discussed in the National Guideline Clearinghouse (NGC) summary of the ACR Appropriateness Criteria® pulsatile abdominal mass, suspected abdominal aortic aneurysm. Additionally, distension from constipation, bowel obstruction, and/or volvulus can also sometimes present as a palpable mass. Evaluation of suspected pelvic mass in female patients is discussed in the NGC summary of the ACR Appropriateness Criteria® clinically suspected adnexal mass.

Overview of Imaging Modalities

Little has been written about the use of imaging in evaluating palpable abdominal masses since the 1980s. Newer reviews and case reports have focused on evaluation of specific masses using computed tomography (CT), ultrasound (US), and magnetic resonance imaging (MRI). Radiography of the abdomen and fluoroscopy play a limited role in the diagnosis and workup of a palpable abdominal mass.

Ultrasound and Computed Tomography

Investigators have found both US and CT to be excellent for affirming or excluding a "palpable" abdominal mass, with sensitivity and specificity values >95%. As few as 16% to 38% of patients referred for suspected abdominal mass had a diagnosis corroborated by imaging in one study. In

other studies, 56.7% (30 of 53) to 68.3% (69 of 101) of patients demonstrated an abnormality confirmed by imaging. Confirmation of the presence of the mass should be the first step in a palpable mass workup, which can often be accomplished by imaging if the physical examination is equivocal.

Both US and CT can demonstrate the organ from which a mass arises. The accuracy of US in determining the organ of origin has been 88% to 91%, whereas CT has fared slightly better at 93%. US is limited by bowel gas in cases of dilated bowel or by body habitus. US is also partly operator-dependent, however likely to a lesser extent with directly palpable abnormalities. As expected, attempts to predict the pathologic diagnosis of masses based on imaging findings are less successful. In several studies US findings correctly suggested the pathologic diagnosis in 77% to 81% of cases, whereas CT findings suggested the diagnosis in 88% of cases.

Investigators have stressed the ability of CT and US to image masses no matter what their organ of origin and have touted them as first-line procedures for evaluating palpable masses. Given its lack of ionizing radiation, US may be preferred as a first-line imaging modality in certain radiation-sensitive populations (e.g., pediatric and pregnant populations) or in patients with suspected subcutaneous masses. CT imaging, which is relatively more costly and involves ionizing radiation, may then be reserved for cases requiring further problem solving secondary to indeterminate US findings or for detecting lesions not visible on US due to body habitus and/or overlying bowel gas. One study demonstrated that, compared with strategies not using CT, the use of CT can result in savings in time for diagnosis and overall cost of hospitalization. Accordingly, when US findings are indeterminate, CT imaging should be obtained in a timely manner. US still remains more appropriate as first-line imaging in this radiosensitive population because of its high sensitivity (90% to 99%), specificity (97% to 100%), and lack of ionizing radiation.

Magnetic Resonance Imaging

At the time of this review, no comparative studies evaluating the imaging of palpable masses with MRI versus CT or US are available to the expert panel's knowledge. However, MRI has many important advantages. MRI may be used to evaluate complex lesions not definitely characterized by US or CT. MRI excels in specifically characterizing fat, protein, fluid, blood products, vascularized tissue, and metal. Furthermore, MRI does not entail exposure to ionizing radiation and demonstrates cross-sectional and multiplanar capability similar to that of US and multidetector CT. Hence, MRI may demonstrate distinct advantages in all patients with palpable abdominal mass, specifically in radiation-sensitive patient populations, when the US findings are nondiagnostic. Although MRI offers potential advantages, its exact performance in evaluating palpable masses relative to US and CT remains unclear given the absence of data; however, it is likely at least comparable.

Radiographs

Radiographs may also be considered as a first step in certain situations. If the patient reports constipation, a radiograph could be used to confirm that diagnosis or to offer alternative diagnosis such as bowel obstruction. However, when radiographs are not diagnostic for the source of palpable mass, further imaging will be required.

Fluoroscopy

Fluoroscopy studies such as contrast enema, upper gastrointestinal (GI) series, and small-bowel follow-through are usually not first-line imaging studies for palpable masses in adults. However, they may be used to further characterize associated degree of obstruction or abnormalities in GI functional function or transit. As extraluminal findings are commonly not assessable by contrast enema or upper GI series, additional imaging may be required even if an intraluminal mass is detected. In pediatric patients, upper GI studies can be used to confirm hypertrophic pyloric stenosis, which can present clinically as a palpable abdominal mass. However, ultrasound is the first-line imaging modality for the evaluation of pyloric stenosis.

Summary of Recommendations

- CT, MRI, and US are complementary imaging modalities for evaluation of a palpable abdominal mass.
- Abdominal radiography and fluoroscopic studies have limited roles for the diagnosis and characterization of a palpable abdominal mass.
- US is the first-line imaging modality when ionizing radiation from CT is of particular concern (e.g., pediatric or pregnant patients) and when the mass is superficial.

Abbreviations

- CT, computed tomography
- MRI, magnetic resonance imaging
- US, ultrasound

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
	<0.1 mSv	<0.03 mSv
	0.1-1 mSv	0.03-0.3 mSv
	1-10 mSv	0.3-3 mSv
	10-30 mSv	3-10 mSv
	30-100 mSv	10-30 mSv
*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."		

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

Palpable abdominal mass

Guideline Category

Diagnosis

Evaluation

Clinical Specialty

Family Practice

Gastroenterology

Internal Medicine

Radiology

Intended Users

Allied Health Personnel

Health Plans

Hospitals

Managed Care Organizations

Physicians

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of radiologic procedures in the diagnosis and evaluation of patients with a palpable abdominal mass

Target Population

Patients with a palpable abdominal mass

Interventions and Practices Considered

1. Computed tomography (CT), abdomen
    - Without contrast
    - With contrast
    - Without and with contrast
2. Magnetic resonance imaging (MRI), abdomen
    - Without contrast
    - Without and with contrast
3. Ultrasound (US), abdomen
4. X-ray
    - Abdomen
    - Contrast enema
    - Upper gastrointestinal (GI) series
    - Upper GI series with small bowel follow-through

Major Outcomes Considered

- Utility of radiologic examinations in differential diagnosis of palpable abdominal masses
- Sensitivity, specificity, and accuracy of radiologic examinations

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Summary

Of the 10 citations in the original bibliography, 8 were retained in the final document. Articles were removed from the original bibliography if they were more than 10 years old and did not contribute to the evidence or they were no longer cited in the revised narrative text.

A new literature search was conducted in August 2013 to identify additional evidence published since the *ACR Appropriateness Criteria® Palpable Abdominal Mass* topic was finalized. Using the search strategy described in the literature search companion (see the "Availability of Companion Documents" field), 59 articles were found. One article was added to the bibliography. Fifty-eight articles were not used due to either

poor study design, the articles were not relevant or generalizable to the topic, the results were unclear, misinterpreted, or biased, or the articles were already cited in the original bibliography.

The author added 6 citations from bibliographies, Web sites, or books that were not found in the new literature search.

Two citations are supporting documents that were added by staff.

See also the American College of Radiology (ACR) Appropriateness Criteria® literature search process document (see the "Availability of Companion Documents" field) for further information.

Number of Source Documents

Of the 10 citations in the original bibliography, 8 were retained in the final document. The new literature search conducted in August 2013 identified one article that was added to the bibliography. The author added 6 citations from bibliographies, Web sites, or books that were not found in the new literature search.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Study Quality Category Definitions

Category 1 - The study is well-designed and accounts for common biases.

Category 2 - The study is moderately well-designed and accounts for most common biases.

Category 3 - There are important study design limitations.

Category 4 - The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:

a. The study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description).
b. The study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence.
c. The study is an expert opinion or consensus document.

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The topic author assesses the literature then drafts or revises the narrative summarizing the evidence found in the literature. American College of Radiology (ACR) staff drafts an evidence table based on the analysis of the selected literature. These tables rate the study quality for each article included in the narrative.

The expert panel reviews the narrative, evidence table and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the variant table(s). Each individual panel member assigns a rating based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development documents (see the "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

Rating Appropriateness

The American College of Radiology (ACR) Appropriateness Criteria (AC) methodology is based on the RAND Appropriateness Method. The appropriateness ratings for each of the procedures or treatments included in the AC topics are determined using a modified Delphi method. A series of surveys are conducted to elicit each panelist's expert interpretation of the evidence, based on the available data, regarding the appropriateness of an imaging or therapeutic procedure for a specific clinical scenario. The expert panel members review the evidence presented and assess the risks or harms of doing the procedure balanced with the benefits of performing the procedure. The direct or indirect costs of a procedure are not considered as a risk or harm when determining appropriateness. When the evidence for a specific topic and variant is uncertain or incomplete, expert opinion may supplement the available evidence or may be the sole source for assessing the appropriateness.

The appropriateness is represented on an ordinal scale that uses integers from 1 to 9 grouped into three categories: 1, 2, or 3 are in the category "usually not appropriate" where the harms of doing the procedure outweigh the benefits; and 7, 8, or 9 are in the category "usually appropriate" where the benefits of doing a procedure outweigh the harms or risks. The middle category, designated "may be appropriate", is represented by 4, 5, or 6 on the scale. The middle category is when the risks and benefits are equivocal or unclear, the dispersion of the individual ratings from the group median rating is too large (i.e., disagreement), the evidence is contradictory or unclear, or there are special circumstances or subpopulations which could influence the risks or benefits that are embedded in the variant.

The ratings assigned by each panel member are presented in a table displaying the frequency distribution of the ratings without identifying which members provided any particular rating. To determine the panel's recommendation, the rating category that contains the median group rating without disagreement is selected. This may be determined after either the first or second rating round. If there is disagreement after the second rating round, the recommendation is "May be appropriate."

This modified Delphi method enables each panelist to articulate his or her individual interpretations of the evidence or expert opinion without excessive influence from fellow panelists in a simple, standardized and economical process. For additional information on the ratings process see the Rating Round Information document on the ACR Web site.

Additional methodology documents, including a more detailed explanation of the complete topic development process and all ACR AC topics can be found on the ACR Web site (see also the "Availability of Companion Documents" field).

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

Given its lack of ionizing radiation, ultrasound (US) may be preferred as a first-line imaging modality in certain radiation-sensitive populations (e.g., pediatric and pregnant populations) or in patients with suspected subcutaneous masses. Computed tomography (CT) imaging, which is relatively more costly and involves ionizing radiation, may be reserved for cases requiring further problem solving secondary to indeterminate US findings or for detecting lesions not visible on US due to body habitus and/or overlying bowel gas. One study demonstrated that, compared with strategies not using CT, the use of CT can result in savings in time for diagnosis and overall cost of hospitalization.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on analysis of the current literature and expert panel consensus.

Summary of Evidence

Of the 17 references cited in the *ACR Appropriateness Criteria® Palpable Abdominal Mass* document, 1 is categorized as a well-designed therapeutic study. Additionally, 16 references are categorized as diagnostic references including 3 quality studies that may have design limitations. There are 13 references that may not be useful as primary evidence.

While there are references that report on studies with design limitations, 1 well-designed study provides good evidence.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Selection of appropriate radiologic imaging procedures for evaluation and diagnosis of patients with a palpable abdominal mass

Potential Harms

Gadolinium-based Contrast Agents

Nephrogenic systemic fibrosis (NSF) is a disorder with a scleroderma-like presentation and a spectrum of manifestations that can range from limited clinical sequelae to fatality. It appears to be related to both underlying severe renal dysfunction and the administration of gadolinium-based contrast agents. It has occurred primarily in patients on dialysis, rarely in patients with very limited glomerular filtration rate (GFR) (i.e., <30 mL/min/1.73 m^2), and almost never in other patients. Although some controversy and lack of clarity remain, there is a consensus that it is advisable to avoid all gadolinium-based contrast agents in dialysis-dependent patients unless the possible benefits clearly outweigh the risk, and to limit the type and amount in patients with estimated GFR rates <30 mL/min/1.73 m^2. For more information, please see the American College of Radiology (ACR) Manual on Contrast Media (see the "Availability of Companion Documents" field).

Relative Radiation Level

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared to those specified for adults. Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® Radiation Dose Assessment Introduction document (see the "Availability of Companion Documents" field).

Qualifying Statements

Qualifying Statements

The American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining

appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Yaghmai V, Yee J, Cash BD, Feig BW, Fowler KJ, Gage KL, Hara AK, Kim DH, Lambert DL, Levy AD, Scheirey CD, Smith MP, Lalani T, Carucci LR, Expert Panel on Gastrointestinal Imaging. ACR Appropriateness CriteriaÂ® palpable abdominal mass [online publication]. Reston (VA): American College of Radiology (ACR); 2014. 5 p. [17 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1998 (revised 2014)

Guideline Developer(s)

American College of Radiology - Medical Specialty Society

Source(s) of Funding

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

Guideline Committee

Committee on Appropriateness Criteria, Expert Panel on Gastrointestinal Imaging

Composition of Group That Authored the Guideline

Panel Members: Vahid Yaghmai, MD, MS (*Principal Author*); Judy Yee, MD (*Co-author*); Brooks D. Cash, MD; Barry W. Feig, MD; Kathryn J. Fowler, MD; Kenneth L. Gage, MD; Amy K. Hara, MD; David H. Kim, MD; Drew L. Lambert, MD; Angela D. Levy, MD; Christopher D. Scheirey, MD; Martin P. Smith, MD; Tasneem Lalani, MD (*Specialty Chair*); Laura R. Carucci, MD (*Panel Chair*)

Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Jung AJ, Yee J, Rosen MP, Blake MA, Baker ME, Cash BD, Fidler JL, Greene FL, Hindman NM, Jones B, Katz DS, Lalani T, Miller FH, Small WC, Sudakoff GS, Tulchinsky M, Yaghmai V, Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® palpable abdominal mass. [online publication]. Reston (VA): American College of Radiology (ACR); 2011. 4 p. [10 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Electronic copies: Available from the American College of Radiology (ACR) Web site .

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

Availability of Companion Documents

The following are available:

- ACR Appropriateness Criteria®. Overview. Reston (VA): American College of Radiology; 2015 Feb. 3 p. Electronic copies: Available from the American College of Radiology (ACR) Web site .
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 2015 Feb. 1 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria®. Evidence table development – diagnostic studies. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria®. Radiation dose assessment introduction. Reston (VA): American College of Radiology; 2015 Feb. 3 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria®. Procedure information. Reston (VA): American College of Radiology; 2015 Feb; 2 p. Electronic copies: Available from the ACR Web site .

- ACR Appropriateness Criteria® Manual on contrast media. Reston (VA): American College of Radiology; 2013. 128 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria® palpable abdominal mass. Evidence table. Reston (VA): American College of Radiology; 2014. 6 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria® palpable abdominal mass. Literature search. Reston (VA): American College of Radiology; 2014. 1 p. Electronic copies: Available from the ACR Web site .

Patient Resources

None available

NGC Status

This summary was completed by ECRI on March 19, 2001. The information was verified by the guideline developer on March 29, 2001. This summary was updated by ECRI on July 31, 2002. The updated information was verified by the guideline developer on October 1, 2002. The summary was updated on August 11, 2006. The summary was updated by ECRI Institute on June 23, 2009. This summary was updated by ECRI Institute on January 13, 2011 following the U.S. Food and Drug Administration (FDA) advisory on gadolinium-based contrast agents. This NGC summary was updated by ECRI Institute on August 17, 2011. This NGC summary was updated by ECRI Institute on April 9, 2015.

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